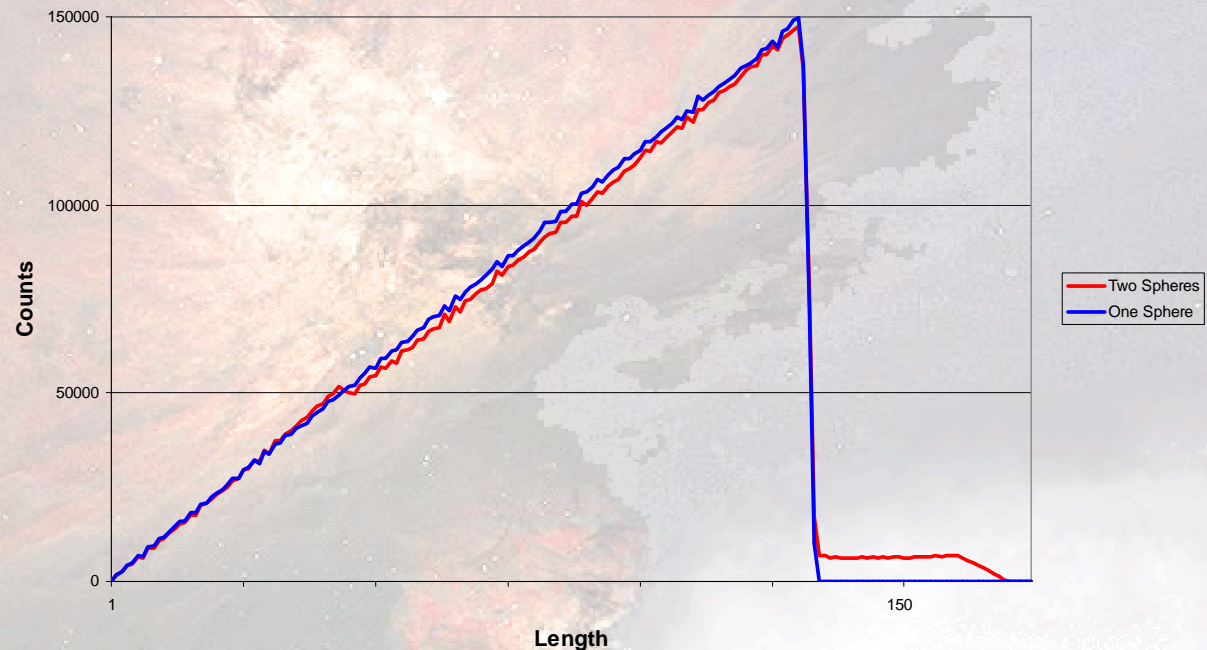
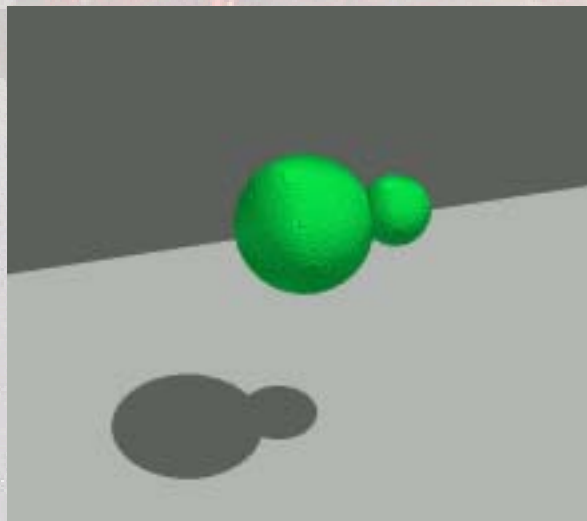
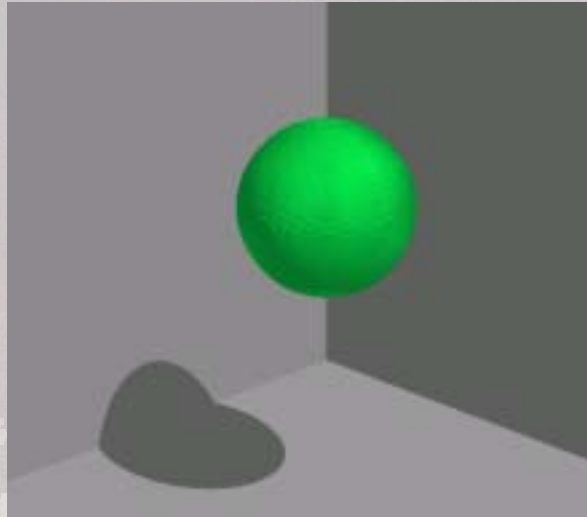


Length Distributions

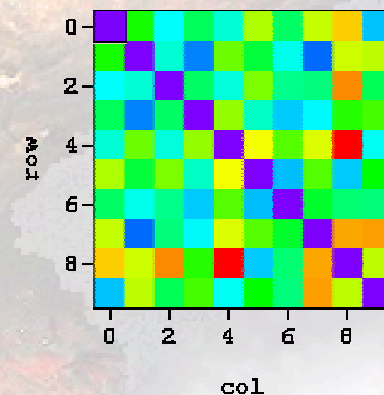
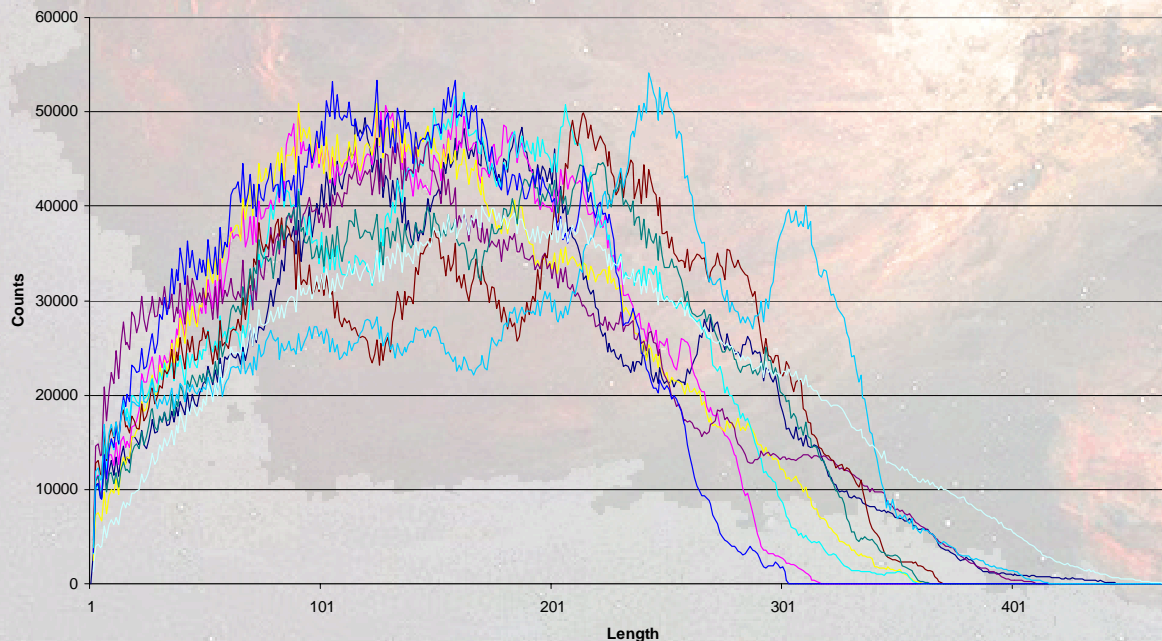
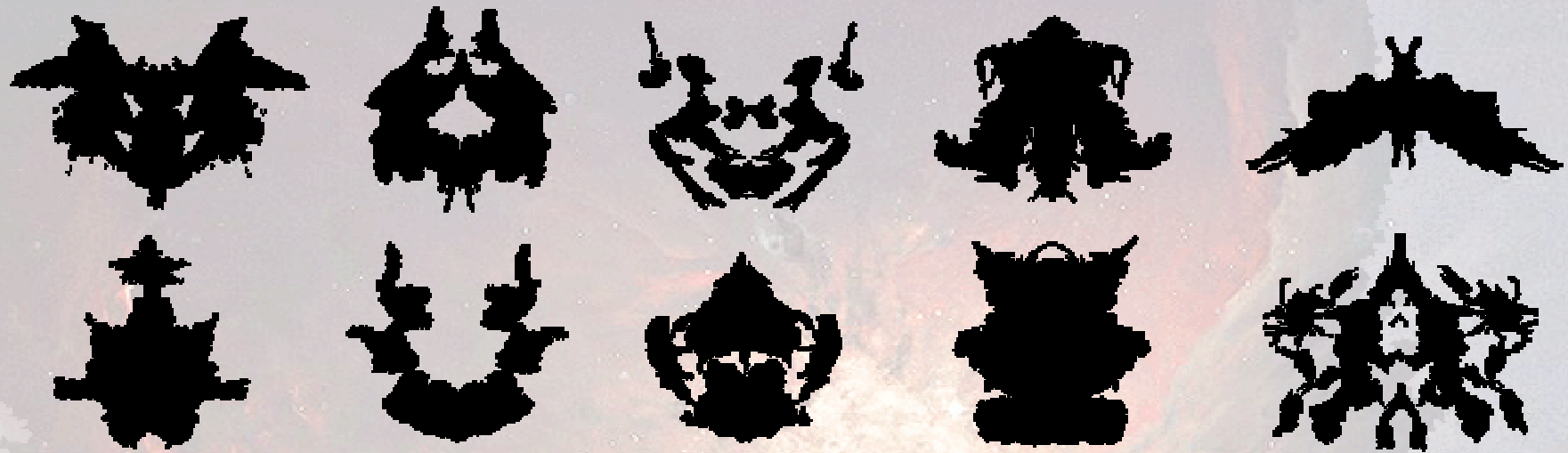
A new method for measuring the shape and physical characteristics of an object.

Length Distributions

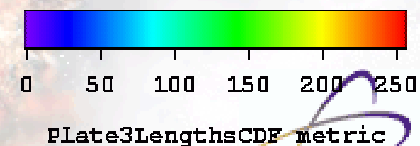
- Randomly sample pairs of points from the object's surface
- Compute the distance between those pairs of points
- Make a histogram of lengths
- Compare shapes by comparing pdf or cdf



Length Distributions



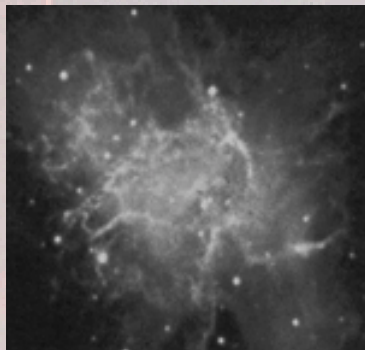
Rorschach
ink blot
similarity



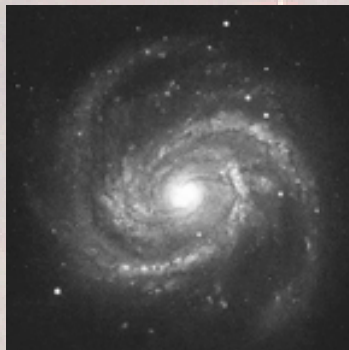
3

Length Distributions

What about objects that don't have well defined edges?



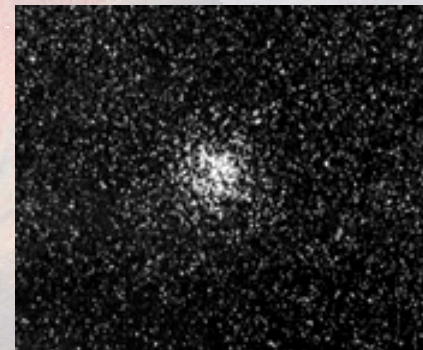
m1



m100



m107

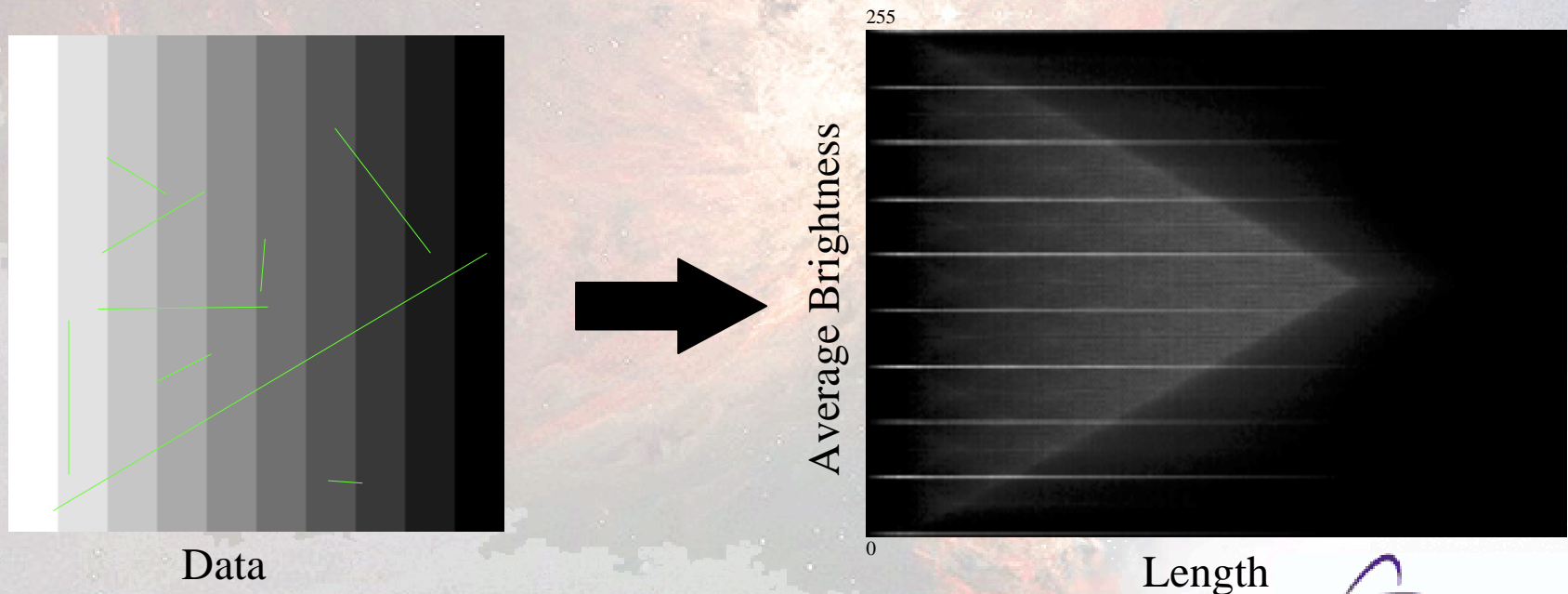


m11

Length Distributions

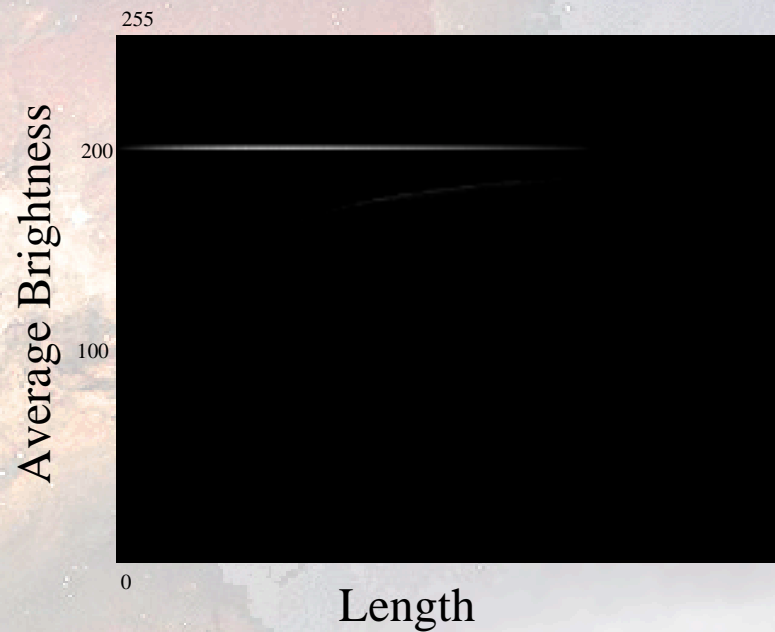
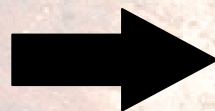
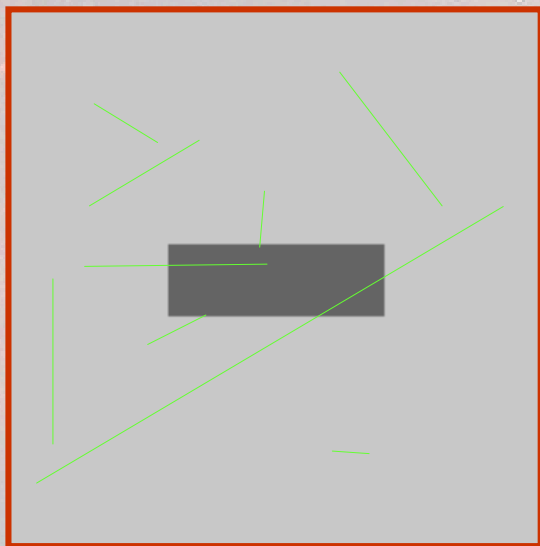
Instead of using length distributions to characterize shape, use them to characterize some physical attribute of the data such as dust density or star distribution.

Example: Compute the average brightness between each pair of randomly generated end points.



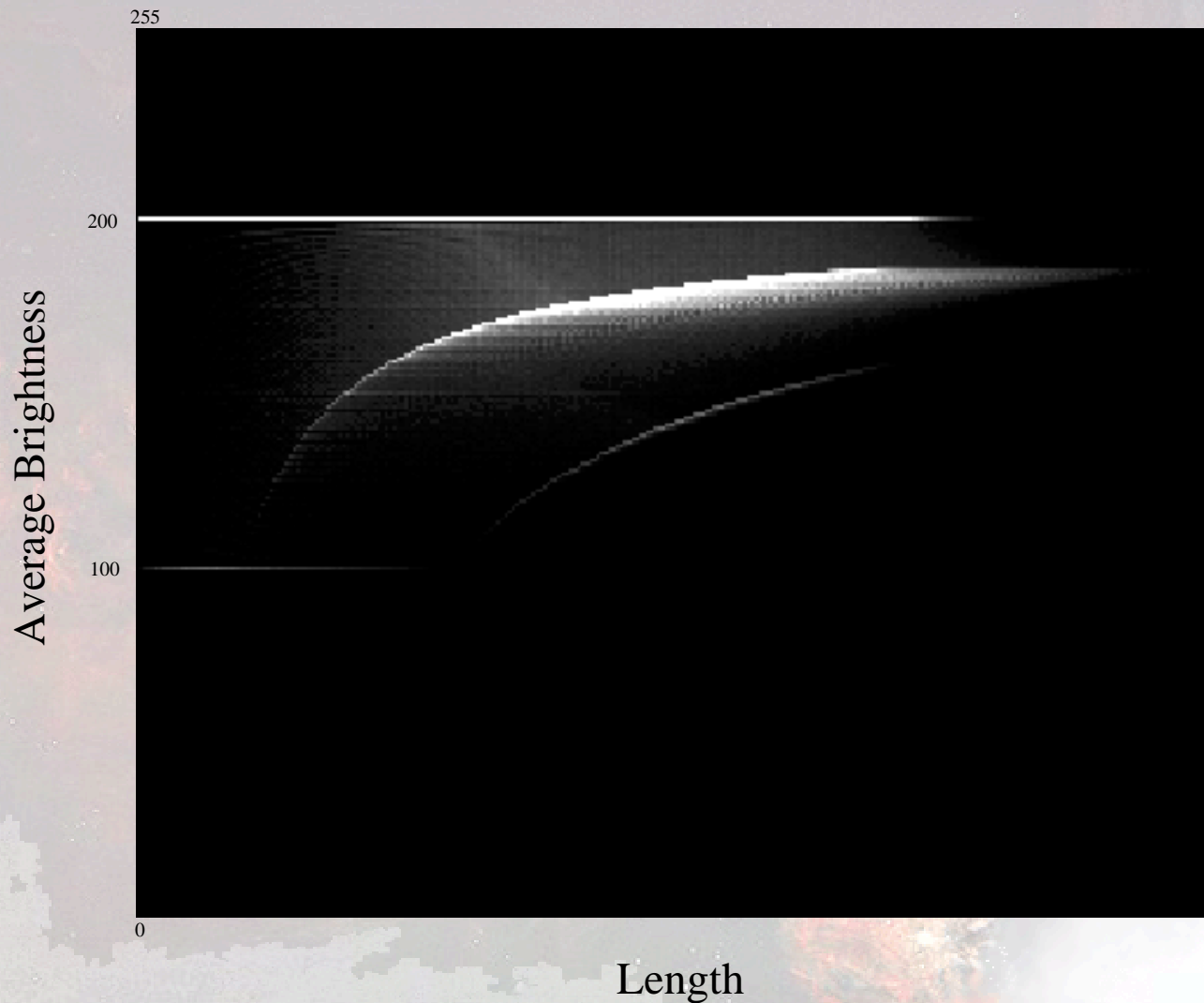
Length Distributions

Second Example



Stretched histogram on next slide

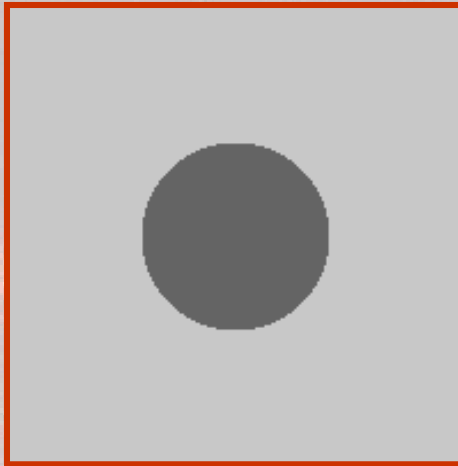
Length Distributions



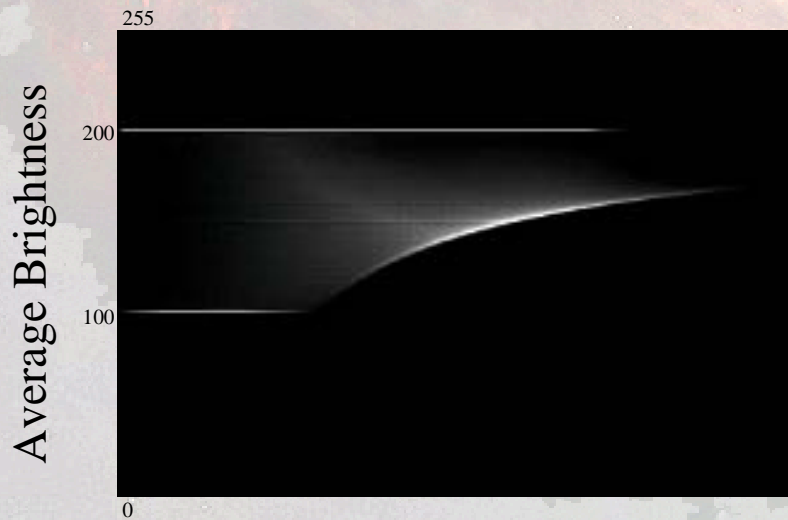
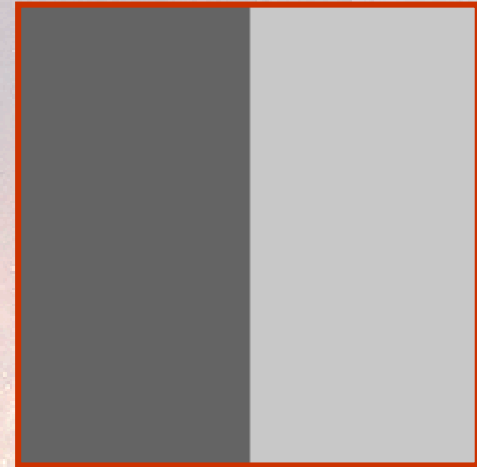
Cropped at 2000 counts

The Length Distribution Histogram conveys a lot of information about the original data.

Length Distributions



Two More
Examples

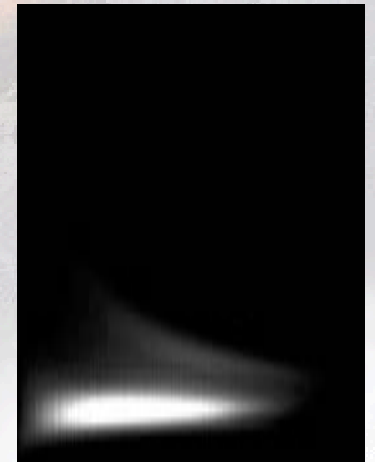
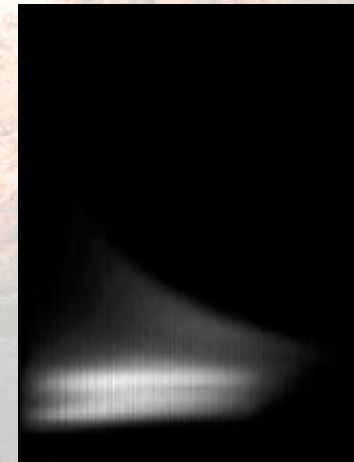
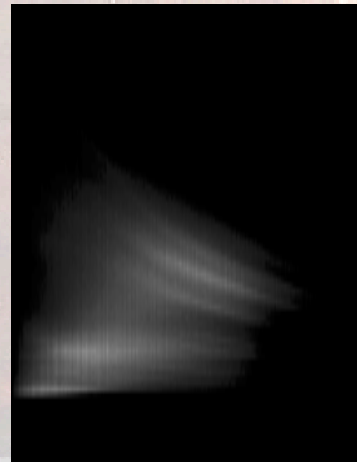
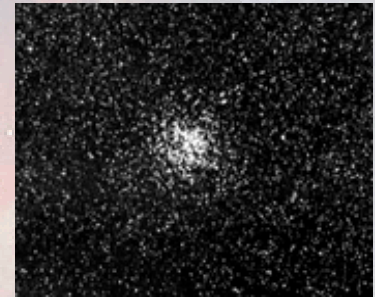
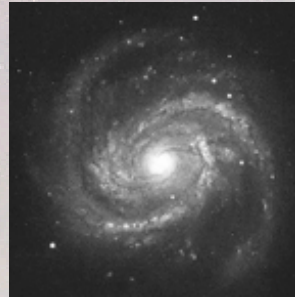
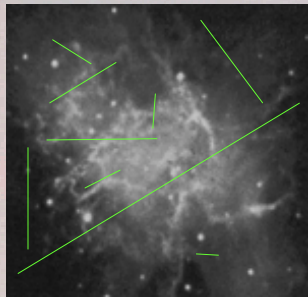


Cropped at 3000 counts

Length

Length Distributions

Method applied to the Messier objects.

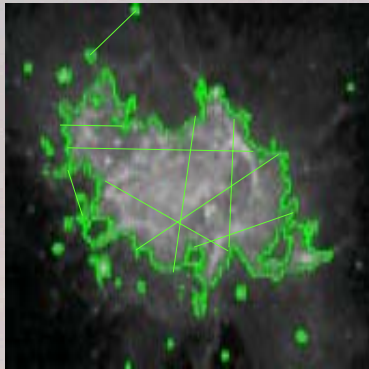


Cropped at 3000 counts

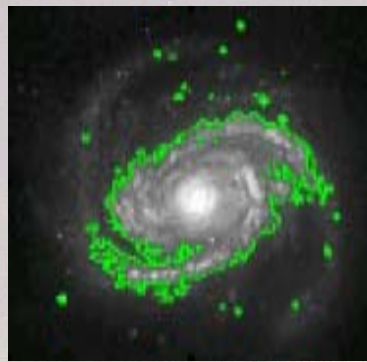
Length

Length Distributions

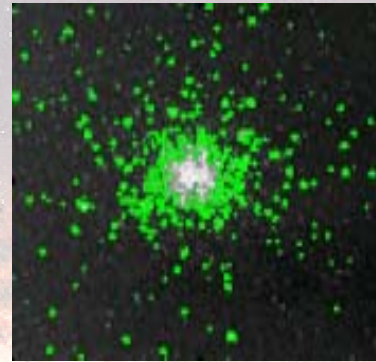
Method applied to Messier object contours.



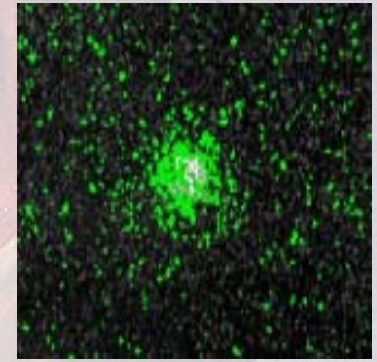
m1
255



m100

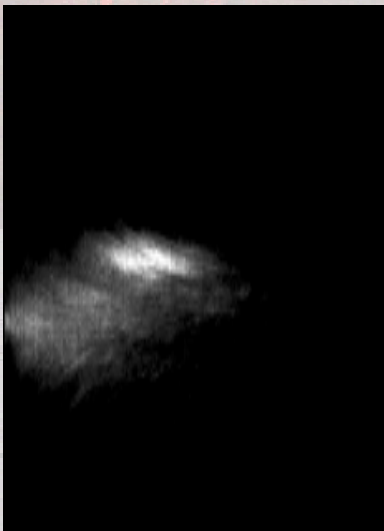


m107

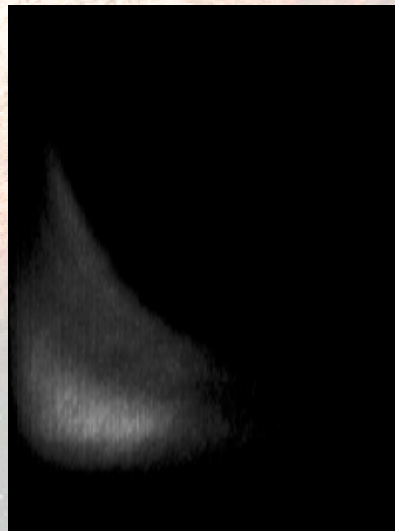
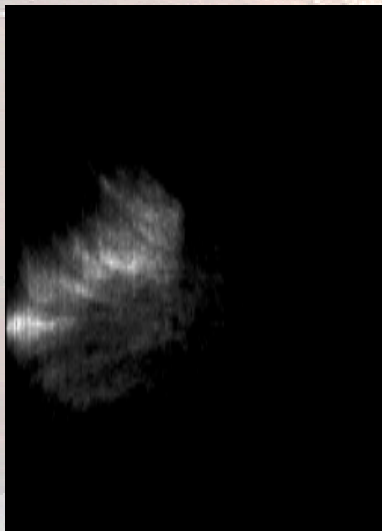


m11

Average Brightness



0



Cropped at 500 counts

Length

Length Distributions

More ideas:

- Brownian path between points
- Use data distribution to weight random numbers.
- It is reminiscent of moments
- Apply lengths to wavelet thumbnail